

# Appendix I. Grid needs ranking methodology

**Table 59** summarizes each level of the ranking matrix. Each level is further described in the following sections.

**Table 59. Distribution planning ranking matrix**

Level	Title	Max possible score	Multiplier	Max total	Peak importance
<b>Level 5</b>	Addresses Safety Concern? Yes = 15, No = 0	15	5	75	21.8%
	Must Do for Customer Commitment? Yes = 15, No = 0	15	5	75	21.8%
<b>Level 4</b>	Compliance Driver or Mitigates Transmission/ Sub-Transmission Constraint? 115 kV+ = 10, 57 kV = 5, No = 0	10	4	40	11.6%
	Precursor to mitigating other grid needs? Two or More = 10, One = 5, No = 0	10	4	40	11.6%
	Frees up or mitigates mobile/ temporary equipment or configuration? Yes = 5, No = 0	5	4	20	5.8%
<b>Level 3</b>	Feeder % Loading of Seasonal Limit (N-0) >100% = 4, 90%-99% = 3, 80%-89% = 2, 67%-79% = 1, <67% = 0	4	3	12	3.5%
	Transformer % Loading of LBNR (N-0) >100% = 4, 90%-99% = 3, 80%-89% = 2, <80% = 0	4	3	12	3.5%
	Existing Total Risk (Substation) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	3	12	3.5%
	Existing CMI Impact (Substation) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	3	12	3.5%
	Substation SCADA Adds New = 3, Replace Obsolete = 1, No or New Sub = 0	3	3	9	2.6%

Level	Title	Max possible score	Multiplier	Max total	Peak importance
<b>Level 2</b>	Existing Total Risk (Feeder) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	2	8	2.3%
	Existing CMI Impact (Feeder) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	2	8	2.3%
	Known Load Growth Impact to Equipment Exceeds Limits in 1-5 Years = 4, Exceeds Planning Criteria = 2, Other or No Growth = 0	4	2	8	2.3%
	Multiple Feeders or Xfmrs Exceed Planning Criteria? Three or More = 3, Two = 2, No = 0	3	2	6	1.7%
	Overload or Voltage Issue for a N-1 condition (Feeder) Yes = 1, No = 0	1	2	2	0.6%
	Overload or Voltage Issue for a N-1 condition (Transformer) Yes = 1, No = 0	1	2	2	0.6%
<b>Level 1</b>	Distribution Xfmr Utilization Index If Summer and Winter Xfmr Peaks are ≥ 80% = 1, Otherwise = 0	1	1	1	0.3%
	Distribution Feeder Utilization Index If Summer and Winter Feeder Peaks are ≥ 67% = 1, Otherwise = 0	1	1	1	0.3%
	Makes Substation DG Ready? Yes = 1, No = 0	1	1	1	0.3%

## I.1 Prioritization criteria and data

Level 5 of the Distribution Planning Ranking Matrix is shown in **Table 60**. The two categories for Level 5, the highest category in the ranking matrix, are safety and customer commitment. Safety and customers are PGE’s highest priority, so the maximum possible score is weighted such that these grid needs are prioritized against all other metrics.

Safety is a top priority for PGE; however, many grid needs and projects originating from Distribution Planning will not have this component. An example of a safety concern in a grid need that may originate from

Distribution Planning is a substation with an arc flash level that requires additional personal protective equipment (PPE) to safely operate equipment. Another example is a substation in an abnormal configuration that requires an outage to the entire substation to safely perform maintenance or operate equipment.

Customer Commitments are considered must-dos for PGE. These are often large commercial or industrial customers with significant, constant power demands that requires physical infrastructure to serve.

**Table 60. Distribution planning ranking matrix — level 5**

Level	Title	Max possible score	Multiplier	Max total	Peak importance
Level 5	Addresses Safety Concern? Yes = 15, No = 0	15	5	75	21.8%
	Must Do for Customer Commitment? Yes = 15, No = 0	15	5	75	21.8%

Level 4 of the Distribution Planning Ranking Matrix is shown in **Table 61**. Level 4 includes heavy weighting for grid needs that have a transmission or sub-transmission constraint mitigation component. Transmission projects (115 kV+) are often driven by North American Electric Reliability Corporation (NERC) compliance obligations for the Bulk Electric System (BES). While sub-transmission (57 kV or radial 115 kV+) is not subject to NERC compliance obligations, PGE strives to operate this system to the same level as the BES. The transmission and sub-transmission systems are the sources to PGE’s distribution system. If there are thermal or voltage issues on the sources to the system, customers are at risk of having their power shut off to alleviate these issues. As a result, grid needs that contain a transmission or sub-transmission mitigation are weighed heavily, with more weight to the BES in order to comply with NERC standards.

Level 4 also includes grid needs that will unlock the ability to mitigate other grid needs. For example, capacity may need to be added to one substation in order to completely offload a different substation during construction. At times, there are a series of grid needs that are dependent upon each other, so if two or more grid needs are dependent on one grid need being mitigated, it is weighed heavier. This is important because there could be a new

development served by a substation, but the system may not be able to accommodate it if that substation needed two other substations to be upgraded before capacity could be added for the new development. This extends timelines to serve customers.

There are times where equipment can fail catastrophically, and temporary measures are implemented until the situation is resolved. This can include a scenario where a substation transformer fails, and PGE must install a mobile or temporary transformer to serve the load that was served by the substation transformer. These mobile and temporary transformers are intended to perform maintenance and not be permanent replacements. In addition, there are situations where a piece of equipment can fail, and that equipment is not replaced immediately. In this situation, the power is diverted to other substations, which can stress the substation and distribution line elements in the area. These scenarios are intended to be temporary until a permanent solution is implemented. To avoid straining other parts of the distribution system, grid needs that mitigate these temporary measures are prioritized in Level 4.

Table 61. Distribution planning ranking matrix — level 4

Level	Title	Max possible score	Multiplier	Max total	Peak importance
Level 4	Compliance Driver or Mitigates Transmission/ Sub-Transmission Constraint? 115 kV+ = 10, 57 kV = 5, No = 0	10	4	40	11.6%
	Precursor to mitigating other grid needs? Two or More = 10, One = 5, No = 0	10	4	40	11.6%
	Frees up or mitigates mobile/ temporary equipment or configuration? Yes = 5, No = 0	5	4	20	5.8%

Level 3 of the Distribution Planning Ranking Matrix is shown in **Table 62**. Level 3 evaluates the current loading of the system in its “normal” state, with all distribution feeders and transformers in service. If a grid need consists of multiple system loading issues, the worst-case loading issue is used to score these categories. While the planning criteria for feeders is 67% of its thermal rating and for transformers is 80% of its thermal rating, scoring is based on the limits of the equipment. However, if feeders or transformers do not exceed these planning criteria, they are assigned a score of zero in these categories.

Level 3 includes weighting for adding SCADA to a substation. SCADA is important for system operators to understand the real-time state of the transmission, sub-transmission and distribution systems. Some substations have obsolete SCADA systems that are also given a score in this category. New substations are always constructed with SCADA.

Level 3 also incorporates risk and reliability improvements into the prioritization, at the substation level. These values are calculated outputs of the economic lifecycle model developed by the AMP team. The existing total risk and existing customer minutes interrupted (CMI) impact for the grid need at the substation level is used to score this category. See **Section 4.4** for more about the PGE risk model.

Table 62. Distribution planning ranking matrix — level 3

Level	Title	Max possible score	Multiplier	Max total	Peak importance
Level 3	Feeder % Loading of Seasonal Limit (N-0) >100% = 4, 90%-99% = 3, 80%-89% = 2, 67%-79% = 1, <67% = 0	4	3	12	3.5%
	Transformer % Loading of LBNR (N-0) >100% = 4, 90%-99% = 3, 80%-89% = 2, <80% = 0	4	3	12	3.5%
	Existing Total Risk (Substation) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	3	12	3.5%
	Existing CMI Impact (Substation) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	3	12	3.5%
	Substation SCADA Adds New = 3, Replace Obsolete = 1, No or New Sub = 0	3	3	9	2.6%

Level 2 of the Distribution Planning Ranking Matrix is shown in **Table 63**. Level 2 also incorporates asset risk, but at the feeder level, out on the distribution line. Like the substation risk, the existing total risk and existing CMI impact for the grid need is used to score this category.

Load growth is also included in Level 2. The metric is evaluated looking at the impact of the load growth on the equipment. If the load growth will result in equipment exceeding thermal or voltage limits within the next one to five years, it is weighted heavier. If the load growth causes equipment to exceed planning criteria, it also receives a score. If the load growth does not cause equipment to exceed thermal or voltage limits or planning criteria, then the system can reliably accommodate this load and no score is assigned. A five-year outlook is used because load growth impacts beyond five years do not need to be

mitigated immediately, as most projects to mitigate grid needs can be implemented within five years.

Level 2 prioritizes grid needs that can be combined to have a single project mitigate multiple feeders or transformers exceeding planning criteria. The ranking increases if there are three or more feeders or transformers that exceed planning criteria.

Finally, Level 2 incorporates redundancy into the scoring. If the grid need involves a feeder or transformer that cannot be completely offloaded to other feeders and transformers, a point is given in these categories. This also speaks to the resiliency of the system; if an unplanned outage occurs during peak loading conditions, the goal is to be able to pick up all the load and leave no customers unserved.

**Table 63. Distribution planning ranking matrix — level 2**

Level	Title	Max possible score	Multiplier	Max total	Peak importance
<b>Level 2</b>	Existing Total Risk (Feeder) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	2	8	2.3%
	Existing CMI Impact (Feeder) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	2	8	2.3%
	Known Load Growth Impact to Equipment Exceeds Limits in 1-5 Years = 4, Exceeds Planning Criteria = 2, Other or No Growth = 0	4	2	8	2.3%
	Multiple Feeders or Xfmrs Exceed Planning Criteria? Three or More = 3, Two = 2, No = 0	3	2	6	1.7%
	Overload or Voltage Issue for a N-1 condition (Feeder) Yes = 1, No = 0	1	2	2	0.6%
	Overload or Voltage Issue for a N-1 condition (Transformer) Yes = 1, No = 0	1	2	2	0.6%

Level 1 of the Distribution Planning Ranking Matrix is shown in **Table 64**. Level 1 evaluates the utilization of the distribution system. If a grid need has a transformer or feeder that exceeds planning criteria for both summer and winter, it is scored in these categories. Level 1 also includes substation DG readiness. If the grid need

mitigation makes a substation DG ready, a point is given in this category. As regulatory policy evolves regarding utilities mitigating interconnection issues, the placement of substation DG readiness in the ranking matrix will be re-evaluated.

**Table 64. Distribution planning ranking matrix — level 1**

Level	Title	Max possible score	Multiplier	Max total	Peak importance
	Distribution Xfmr Utilization Index If Summer and Winter Xfmr Peaks are ≥ 80% = 1, Otherwise = 0	1	1	1	0.3%
<b>Level 1</b>	Distribution Feeder Utilization Index If Summer and Winter Feeder Peaks are ≥ 67% = 1, Otherwise = 0	1	1	1	0.3%
	Makes Substation DG Ready? Yes = 1, No = 0	1	1	1	0.3%

Sometimes grid needs can result in the same score when populating the Ranking Matrix. The combined score for Levels 5 and 4 is used as a tiebreaker in this instance.